



**SLOVENSKI STANDARD**  
**SIST EN 15095:2008+A1:2009**  
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Power-operated mobile racking and shelving, carousels and storage lifts - Safety requirements

Kraftbetriebene verschiebbare Paletten- und Fachbodenregale, Umlaufregale und Lagerlifte - Sicherheitsanforderungen

Élévateurs de stockage, carrousels et rayonnages à palette et à tablette, mobiles et motorisés - Prescriptions de sécurité

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**ICS:**

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EUROPEAN STANDARD

**EN 15095:2007+A1**

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## Power-operated mobile racking and shelving, carousels and storage lifts - Safety requirements

Élévateurs de stockage, carrousels et rayonnages à palette et à tablette, mobiles et motorisés - Prescriptions de sécurité

Kraftbetriebene verschiebbare Paletten- und Fachbodenregale, Umlaufregale und Lagerlifte - Sicherheitsanforderungen

This European Standard was approved by CEN on 23 September 2007 and includes Amendment 1 approved by CEN on 9 November 2008.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

## Contents

Page

Foreword.....	4
Introduction .....	5
<b>1 Scope .....</b>	<b>6</b>
<b>2 Normative references .....</b>	<b>6</b>
<b>3 Terms and definitions .....</b>	<b>7</b>
<b>4 Significant hazards .....</b>	<b>9</b>
4.1 Mechanical hazards .....	9
4.2 Electrical power hazards.....	10
4.3 Hazards through ignoring ergonomic principles in machine design.....	10
4.4 Hazards caused through failure of power supply, failure of machine parts or other functional faults .....	10
4.5 Hazards arising from inappropriate design or failure of safety systems .....	10
4.6 Hazards caused through electromagnetic influences .....	10
4.7 List of significant hazards .....	11
<b>5 Safety requirements and protective measures.....</b>	<b>14</b>
5.1 General requirements.....	14
5.2 Mechanical hazards .....	14
5.3 Electrical hazards .....	21
5.4 Ergonomics .....	22
5.5 Power supply faults, machine parts failing or other malfunctions .....	23
<b>6 Verification of the safety requirements and/or protective measures.....</b>	<b>24</b>
6.1 Conformity of safety measures to safety requirements.....	24
6.2 Design/Manufacturing phase.....	26
6.3 At the installation site, before power is switched on.....	26
6.4 Commissioning.....	27
<b>7 Information for the user .....</b>	<b>27</b>
7.1 Instruction handbook .....	27
7.2 Marking .....	29
<b>Annex A (informative) Types of power-operated storage equipment.....</b>	<b>31</b>
<b>Annex B (informative) Power-operated mobile storage systems.....</b>	<b>34</b>
<b>Annex C (informative) Rail tolerances for mobile racking .....</b>	<b>36</b>
<b>Annex D (normative) Rack and pinion .....</b>	<b>39</b>
D.1 Pinion .....	39
D.2 Rack(s) .....	39
D.3 Rack/pinion(s) engagement.....	39
<b>Annex E (informative) Chains in vertical carousels.....</b>	<b>41</b>
<b>Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC .....</b>	<b>42</b>
<b>Annex ZB (informative)  Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC  .....</b>	<b>43</b>
<b>Bibliography .....</b>	<b>44</b>

**Figures**

Figure A.1 — Storage equipment with vertically circulating carriers (vertical carousels).....	31
Figure A.2 — Storage equipment with horizontally circulating carriers (horizontal carousels) .....	31
Figure A.3 — Storage lift .....	32
Figure A.4 — Mobile shelving.....	32
Figure A.5 — Mobile racking .....	33
Figure B.1 — Clearances to building parts (see 5.2.4.2) .....	34
Figure B.2 — Protective devices and edge clearance according to 5.2.4.3 .....	34
Figure B.3 — Example of a cable barrier .....	35
Figure B.4 — Example of local protection on mobile racking according to 5.2.4.7 .....	35
Figure C.1 — Twist of the rail .....	36
Figure C.2 — Maximum absolute vertical tolerances.....	36
Figure C.3 — Maximum relative vertical tolerance.....	37
Figure C.4 — Maximum inclination of the rails.....	37
Figure C.5 — Straightness of the rails .....	37
Figure C.6 — Uneven floor.....	38
Figure D.1 — Rack / pinion(s) engagement.....	40
Figure E.1 — Third deep system.....	41
Figure E.2 — Horizontal system.....	41

**Tables**

Table 1 — List of significant hazards .....	12
Table 2.....	25

**EN 15095:2007+A1:2008 (E)****Foreword**

This document (EN 15095:2007+A1:2008) has been prepared by Technical Committee CEN/TC 149 "Power-operated warehouse equipment", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

This document supersedes EN 15095:2007.

This document includes Amendment 1, approved by CEN on 2008-11-09.

The start and finish of text introduced or altered by amendment is indicated in the text by tags  $\boxed{A_1}$   $\boxed{A_1}$ .

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

$\boxed{A_1}$  For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document.  $\boxed{A_1}$

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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## Introduction

This standard is a type C standard as stated in EN ISO 12100.

The machinery concerned and the extent to which hazards, hazardous situations and hazardous events are covered are indicated in the scope of this standard.

For machines designed and built according to the specifications of this Type C Standard the following applies:

"When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards for machines that have been designed and built according to the provisions of this type C standard."

When this standard was prepared it was assumed that:

- only trained staff would operate, repair or maintain the machine;
- components without special requirements are
  - 1) sized in accordance with good engineering practice and methods of calculation including all types of failure;
  - 2) correctly constructed mechanically and electrically;
  - 3) made of materials of adequate loading capacity and of suitable quality;
  - 4) made of materials that are fit for that purpose.
- components are kept in a good repair and operating condition so that the required characteristics can be maintained in spite of wear and tear;
- sizing of load bearing parts ensures safe operation of the machine in a loading range from 0 % to 100 % of the nominal capacity and during testing conditions if applicable;
- details of particular conditions of use and the installation site are agreed between user and manufacturer;
- working area is adequately illuminated;
- installation site permits safe operation of the machine.

**EN 15095:2007+A1:2008 (E)****1 Scope**

**1.1** This European Standard deals with the safety requirements for the following types of power-operated storage equipment:

- storage carousels;
- storage lifts;
- mobile shelving, pallet racking and cantilever racking

with the objective of eliminating or minimising the hazards described in Clause 4. These hazards can arise during installation, starting up, operation, maintenance, testing and dismantling of the equipment.

**1.2** It is essential that the safety requirements and/or measures taken in this standard be applied to storage equipment which operates indoors. Under difficult conditions, it is essential that additional hazard analysis and safety measures be taken into account, e. g. outdoor conditions, freezer applications, high temperatures, corrosive environment, strong magnetic fields, risk of explosive atmosphere, radioactive conditions, storage goods which due to their nature could generate hazardous situations (e. g. molten metal, acids/alkalis, fragile goods or explosives), effects of earthquakes and also contact with food.

**1.3** Examples of power-operated storage equipment to which this standard applies are shown in Annex A.

**1.4** With regard to buildings and parts of buildings, this standard applies only insofar that an assessment regarding hazards and risks in connection with interfaces to the storage equipment is carried out.

**1.5** Storage equipment whose only power source is directly used human labour or gravity are excluded from the scope of application of this standard.

**1.6** Power-operated storage equipment or parts of them do not fall under the regulations for passenger lifts. They are intended to handle and store goods. They are not intended to transport passengers under normal use (except for maintenance) and therefore not considered to be lifts (elevators).

**1.7** This standard does not take hazards into account, which arise from noisy environments or environments subject to electromagnetic interference outside the range quoted in EN 61000-6-2.

**2 Normative references**

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

**A1** *deleted text* **A1**

EN 349:1993, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

**A1** *deleted text* **A1**

EN 1760-1, *Safety of machinery — Pressure sensitive protective devices — Part 1: General principles for the design and testing of pressure sensitive mats and pressure sensitive floors*

EN 1760-2, *Safety of machinery — Pressure sensitive protective devices — Part 2: General principles for the design and testing of pressure sensitive edges and pressure sensitive bars*

EN 12369-1, *Wood-based panels — Characteristic values for structural design — Part 1: OSB, particleboards and fibreboards*



EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005, modified)*

EN 60335-1, *Household and similar electrical appliances — Safety — Part 1: General requirements (IEC 60335-1:2001, modified)*

EN 60950-1:2006, *Information technology equipment — Safety — Part 1: General requirements (IEC 60950-1:2005, modified)*

EN 61496-1, *Safety of machinery — Electro-sensitive protective equipment — Part 1: General requirements and tests (IEC 61496-1:2004, modified)*

EN ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003)*

EN ISO 13849-1, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2006)*

EN ISO 13850, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2006)*

EN ISO 13857:2008, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)* <sup>A1</sup>

ISO 6336-1, *Calculation of load capacity of spur and helical gears — Part 1: Basic principles, introduction and general influence factors*

ISO 6336-2, *Calculation of load capacity of spur and helical gears — Part 2: Calculation of surface durability (pitting)*

ISO 6336-3, *Calculation of load capacity of spur and helical gears — Part 3: Calculation of tooth bending strength*

ISO 6336-5, *Calculation of load capacity of spur and helical gears — Part 5: Strength and quality of materials*

ISO 6336-6, *Calculation of load capacity of spur and helical gears — Part 6: Calculation of service life under variable load*

ISO 10823, *Guidelines for the selection of roller chain drives*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100-1:2003 and the following apply.

#### 3.1

##### carousels

horizontal and/or vertical circulating storage equipment with load carriers (freely suspended carriers, suspended rods or others)

NOTE They can be provided with one or more access openings (see Figure A.1 and Figure A.2)

**EN 15095:2007+A1:2008 (E)****3.2****storage lifts**

designed to take goods placed on load carriers (e. g. storage containers). The in-built lift unit carries the load carriers (e.g. storage containers) from an access opening to storage locations in a racking tower, or from a storage location to an access opening. Storage lifts can have one or more access openings on one or more levels (see Figure A.3)

**3.3****mobile shelving**

mobile shelving comprises a series of hand loaded adjustable load carrying surfaces (shelves) supported by upright frames all of which is in turn fixed to a movable base unit. This base unit is supported on wheels mounted in the base unit which run on rails mounted in or on the floor. The system is designed to be loaded by hand with multiple loads all of which are substantially less than the total carrying capacity of the shelf. The system is not designed to be loaded or unloaded by mechanical equipment (see Figure A.4)

**3.4****mobile racking**

mobile racking comprises a skeleton framework of fixed or adjustable design supporting unit loads generally without the use of shelves. This skeleton framework is in turn fixed to movable base units supported on wheels mounted in the base unit, which run on rails mounted in the floor. The system is designed for the storage of unit loads where loading or unloading is generally by mechanical means (see Figure A.5)

**3.5****cable barriers**

current carrying access barrier

**3.6****access opening**

opening in cladding or covers for the purposes of loading and unloading

**3.7****compartment load**

intended permissible uniformly distributed load of a horizontal load carrying surface between two upright frames

**3.8****bay load**

sum of compartment loads between two upright frames (including base supported compartment load)

**3.9****accidental stop**

stopping of racking equipment running against an obstacle

**3.10****normal stop**

stopping of a mobile rack under controlled manner

**3.11****emergency stop**

stopping of the machine as a result of the operation of an emergency device

**3.12****authorised person**

person instructed to operate the machine and/or to carry out specified maintenance or other work which may have safety implications

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**A1) 3.13****competent person**

is one who by training, on the job experience and by qualified instruction (e.g. by the producer) has sufficient knowledge and experience of the storage system concerned that he is able to identify risks and dangerous situations before they arise. The person should be aware of the relevant health and safety regulations in force at the time in order to prevent accidents. This should include the safe working condition of the equipment concerned (e.g. this might include skilled and qualified fitters from the manufacturer and/or maintenance companies or trained staff of the company operating the machine) **A1)**

**A1) 3.14 A1)****operator**

person authorised to operate machines

**A1) 3.15 A1)****global aisle-free**

system to stop and inhibit the movement of racks unless the aisle has been observed and confirmed to be clear of obstructions and all personnel

## 4 Significant hazards

NOTE Under this section the significant hazards are listed:

### 4.1 Mechanical hazards

#### 4.1.1 Crushing and shearing hazards

These hazards can occur, when parts move towards, relative to, or past one another, or towards, relative to or past fixed parts whereby people or parts of their body can be crushed or severed.

#### 4.1.2 Entanglement hazards

These hazards can occur, when projecting sharp edges, teeth, wedges, screws, lubricating nipples, shafts, ends of shafts or similar items move in such way that people, parts of their body or their clothing can be caught and carried along.

#### 4.1.3 Drawing-in hazards

These hazards can occur, when parts move in such way that a narrow throat is formed in which people or parts of their body or their clothing can be pulled in.

#### 4.1.4 Hazards from impact/collision

These hazards can occur, when parts move relative to people in such way that they themselves or parts of their body can be injured through being impacted or run into.

#### 4.1.5 Hazards arising from objects falling out and/or dropping

These hazards can occur through objects falling out of and/or dropping from the storage equipment, parts of the storage equipment or the stored goods.

#### 4.1.6 Hazards arising from potential failure of structure

These hazards might be caused, for example, by failure of supporting parts or fastenings.

**EN 15095:2007+A1:2008 (E)****4.1.7 Hazards arising from slipping, stumbling or falling**

These hazards can occur, for example, due to the construction of flooring in the area of mobile storage equipment.

**4.1.8 Hazards arising from potential lack of tipping stability**

These hazards can occur for example due to incorrect motor power/braking, inappropriate wheel carriage design.

**4.2 Electrical power hazards**

Electrical hazards can occur for example through:

- direct or indirect contact with live parts as a consequence of damage to the insulation or ingress of dirt, water etc.;
- incorrect isolation of power supply to the system or parts of the system due to inappropriate circuit design.

**4.3 Hazards through ignoring ergonomic principles in machine design**

These hazards can arise for example, as a result of:

- badly arranged operating equipment and working places;
- excessive strain on operating staff in regard to speed and energy requirements.

**4.4 Hazards caused through failure of power supply, failure of machine parts or other functional faults**

Hazards caused by failure of the power supply can occur when storage equipment or storage goods run backwards or fall unintentionally.

Hazards caused by failure of machine parts, such as the failure of suspension chains.

**4.5 Hazards arising from inappropriate design or failure of safety systems**

These hazards can, for example, occur through:

- unfavourable positioning of emergency shutdown devices;
- inappropriate positioning of safety related devices;
- inappropriate choice of safety devices;
- missing or faulty interlocking of maintenance access covers with the drive.

**4.6 Hazards caused through electromagnetic influences**

These hazards can, for example, occur through:

- inappropriate design of electrical control system;
- inappropriate selection of electrical subassemblies.

#### 4.7 List of significant hazards

Table 1 shows a list of significant hazardous situations and hazardous events that could result in risks to persons during normal use and foreseeable misuse. It also contains the relevant clauses in this standard that are necessary to reduce or eliminate the risks associated with those hazards.

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